Art. VI.—*On the Meteorology of Hemorrhage.*—By B. F. Joslin, M. D., of the City of New York.

Medical and meteorological studies bear some resemblance to each other in the complexity of the subjects and the difficulty of establishing complete and comprehensive theories.

Medical meteorology combines difficulties inherent in both classes of sciences; and though destined at some future time to be a science of great interest and importance, it is at present, and is perhaps for a considerable period longer to be, in a condition which may be termed fragmentary.

In the hope of adding a fragment to those already collected, I have endeavoured to examine a limited portion of this extensive field.

The object here proposed is to examine among the various causes whose combined influence determine the time when a spontaneous *hemorrhage* shall occur; whether the condition of the atmosphere has an influence so great as to be detected by a careful comparison of medical and meteorological observations.

In the course of a medical practice of fifteen years, and the daily observation and record of meteorological facts during the greater part of this time, the writer has become so far convinced of the existence of such an influence, as to induce him to undertake the labour of making a numerical estimate for obtaining the average results in relation to a considerable number of cases.

The examination has been restricted to cases of hæmoptysis and uterine hemorrhage occurring in his own practice, and from lack of time, and the great labour required for calculating the mean meteorological results for all the months and years up to the present time, those three continuous years in which the meteorological observations were more nearly complete, have been selected. This period ended in May, 1837. The locality was Schenectady, New York.

Of the cases of hæmoptysis and uterine hemorrhage scattered through these three years, those only have been selected whose date was recorded; they amount only to fifty-four. In two or three of the cases selected, there may be a slight uncertainty as to the day of attack, but in nearly half of them the hour of attack was recorded.

A few remarks may be indulged in respect to the rules and principles by which the estimate was made..

The selection of cases has been determined solely by the degree of evidence as to the exact day or hour of attack; and to avoid any bias from preconceived opinions, the selections have been made previously to consulting the meteorological journal. In but one instance has an exacerbation, or an attack within two days of a previous attack of the same patient, been included.

The mean dew-point of each day of attack has been selected as the dew-

point for the time, and compared with the average for the corresponding month. As the changes of *season* have comparatively little influence on the mean monthly atmospheric pressure, the mean height of the barometer for the corresponding *year* has been taken as the standard with which to compare the height as observed at the hour nearest that of the attack, or, in case of uncertainty as to this, the mean height of the day. For times when this instrument was exposed to considerable changes of temperature, a correction for temperature has been generally made. In regard to rain or snow, where either the hour of its occurrence or that of the attack was unknown, there no attempt has been made to arrive at the probable *fractions* of a day.

No attempt is here made to distinguish between the effects of rain and those of snow. Indeed, this distinction for all purposes of medical meteorology, is frequently more apparent than real. What falls as rain at the earth's surface, is frequently the product of melted snow. Meteorologists seem rarely to reflect on this fact, but, on the contrary, erroneously attribute the formation of snow to the congelation of clouds or of rain. For want of a more appropriate word in our language to express the descent either of snow or rain, the term storm, or falling weather, will be sometimes employed; and those days will, for the sake of brevity, be called stormy days, on any part of which rain or snow fell.

For the purpose of examining the influence of rain and snow, and of the barometrical and hygrometrical conditions and changes of the atmosphere, the tables have been arranged in fourteen columns. The first shows the number of the case and the date of attack; the second column shows the number of stormy days immediately preceding each day of attack or commencement of hemorrhage; the third the number of the days immediately succeeding the day of attack; the fourth column the proportion of stormy days in the corresponding month, expressed in hundredths, the whole number of days in the month being taken as unity; the fifth column the number of days (and fractional parts when known) between the commencement of the hemorrhage and the nearest preceding day, or part of day, of storm; sixth, the number of days which elapsed between the time of attack and the next succeeding storm. Hence O in both these columns signifies that the storm existed at the hour, or at least on the day, of attack. The seventh exhibits the condition of the atmospheric pressure on the day, and, as near as practicable, on the hour of attack, as compared with the pressure twenty-four hours previous. The eighth exhibits the same thing for the time of attack; *i. e.*, shows whether the barometer was rising, falling, or stationary, according to the evidence afforded by the next succeeding as compared with the next preceding observation of the same day. In the ninth and tenth the barometer is compared with the mean, in terms of hundredths of an inch, above or below. The eleventh column exhibits the dew-point on the day of attack; the twelfth the mean dew-point of the month; the thirteenth the difference between the dew-point and temperature of the air for

the day, and the fourteenth the same for the month. All the columns are complete except those for dew-point, which could not be conveniently obtained for the colder months. This has been given for thirty-three cases. The first table exhibits the results for uterine hemorrhage, and the second for hæmoptysis.

Results. Season and temperature. In examining the results let us first inquire the influence of season. The months in which the greatest number of cases occurred were June and September, hæmoptysis taking the lead in the former, and uterine hemorrhages in the latter. It would seem that neither the extreme of heat nor that of cold is among the most influential causes. Whether change of temperature at the time has an influence, is a different inquiry; and by examining the dew-point, and the difference between it and the temperature, it is seen that some depression of temperature is a usual concomitant of hemorrhage. The average depression of the thermometer below the monthly mean was 3°, but the fall was greater for hæmoptysis.

The hygrometrical state of the air may be next examined; first, in relation to the dew-point, which affords a measure of the absolute quantity of contained vapour; and secondly, in relation to the difference between the dew-point and temperature, which affords a measure of the degree of dampness, in other words the degree of approximation to the point of precipitation.

Now the average dew-point for the whole collection of cases is about 3° below that of the corresponding months. The air then, at the earth's surface, contained less than the usual amount of vapour. We are not to conclude that the air possessed a more desiccating quality; for the average difference between the dew-point and temperature (taking into account the relative number of the two kinds of cases) differed but one-tenth of a degree from the monthly mean. The average dampness for each class of hemorrhage was near the usual standard, but was rather greater for hæmoptysis. As the average dampness for both classes collectively was almost exactly the same as that for the corresponding months, there is no evidence that dampness *per se* has any influence on hemorrhage. As to the absolute height of the dew-point, there was a close agreement between the two classes, each giving (within one-third of a degree) a difference of 3° from and below that of the month. Here then, there is something which appears to be conducive to hemorrhage in general; but when we recollect that there was a corresponding depression of temperature, which leaves the dampness unchanged, and also that great cold has of itself little predisposing influence, we become, in the present stage of the inquiry, restricted to the conclusion, that that atmospheric agency, which conduces mainly to hemorrhage, is neither dryness nor humidity, nor heat nor cold, but some change or condition—whatever it be—which, on an average, is attended by a reduction of temperature and such a corresponding diminution of vapour as leaves the degree of humidity nearly unchanged.

Atmospheric pressure next claims attention, being, like temperature and humidity, one of the less complicated phenomena, and the subject of instrumental measurement.

The barometrical results were more remarkable than the thermometrical or hygrometrical ones, and very different in some respects from what generally received opinions would lead us to anticipate.

If we regard the average changes of pressure during the twenty-four hours preceding the time of attack, we find nothing remarkable, unless it be a remarkable want of influence, shown by a strict conformity to what the theory of probabilities would require for the average results of accidents in a numerous collection of cases. In other words, the instances in which the barometer was rising were nearly equal to those in which it was falling; and this correspondence extended to both tables. Before the uterine hemorrhages, the barometer was rising 13 and falling 14 times; and before hæmoptysis, the proportion was also 13 to 14. This shows, if any thing, a slight tendency to depression, but not sufficient to justify any general conclusion for this number of cases.

The case is different for the days of attack. On those the barometer was generally falling, and in a greater proportion of instances than could, with any probability, be attributed to accident. Out of 54 cases, it was in 35 falling at the time of attack, in 18 rising, and in 1 stationary.

Hence the probability that the atmospheric pressure shall be diminishing rather than increasing at the time of an attack, is about as TWO TO ONE. A confirmation of the opinion that the barometer will generally be found falling at or near the commencement of a hemorrhage, is found in the fact that the proportion was almost exactly the same for both classes of hemorrhage, being 17 to 9 for the uterine, and 18 to 9 for the pulmonary. It is difficult to believe that this falling of the barometer was accidental, when the proportion was so great and so nearly correspondent for both kinds of hemorrhage.

If this great influence of a diminution of atmospheric pressure be mechanical, we should be inclined, *à priori*, to anticipate that the effect would be at the maximum when the pressure was at a minimum, and the blood vessels in an unusual degree deprived of this external and mechanical support.

But it is interesting to notice, that the facts exhibited in another column contradict such a conclusion. The barometer, though generally *falling*, is *not low*, but on an average about one-third of a tenth of an inch *above* the mean height for the year. That the existence of some excess above the mean was not the accidental result of a moderate number of cases, appears probable from the fact that the two classes of hemorrhage differed in this respect from each other, only about one-fourth part as much as one of them differed from the general average of the year.

Instead of the number of times above and below, the average height has

been selected, as being less liable to vitiation by errors as to the exact time of attack, or the exact barometrical heights, whether mean or particular.

If we select those cases which are unexceptional as to reliance on small differences, for example, those whose exact hour of commencement was known, and was between sunrise and 10 o'clock, P. M., between which times the barometer was consulted, we find it to have averaged about one and a half tenths above the mean, for each class of hemorrhages, and for each to have been two or three times as often above the mean as below it. The range was from only a twentieth of an inch below, to more than a third of an inch above.

From all the barometrical facts we may draw the conclusion, that at the commencement of hæmoptysis or uterine hemorrhage, *the barometer is generally falling*, and from *some points above the mean.* There would seem to be, in general, some influence predisposing to hemorrhage, between the time of maximum and medium height, for that section of the month in which the attack occurs.

Falling weather remains to be examined. A storm of rain or snow is a complex phenomenon, and involves changes in those more elementary ones which have hitherto engaged our attention. It is generally preceded—frequently at an interval of some days—by an increase of atmospheric pressure, and a diminution of the dew-point; but, as the storm approaches, all these usually approach the mean, and pass to the other side before or after its commencement. It will be perceived that the state of things, so far as examined, which gives the hemorrhagic tendency, seems usually to agree with some part of this transition period.

Let us see how far this conclusion conforms to the observations on the times of hemorrhages and storms.

In the first place, the average time to the nearest preceding day of falling weather exceeded that to the nearest succeeding day; and, if we exclude the storms which occurred on the days of the hemorrhage, the average distance between the nearest past and future storms was about three-fourths of a day; the difference being, however, greater for uterine hemorrhages. The mean results at the feet of the tabular columns are deduced by including the stormy days on which hemorrhages occurred, which gives a less absolute distance, but the same disproportion between the distances to past and future storms; the ratio being as 35 to 26, for both classes of hemorrhages collectively. The disproportion is seen to be less for hæmoptysis than uterine hemorrhage, but the balance decidedly on the same side.

We see the same tendency by examining, in a different way, the number of times in which the nearest storm occurred after the uterine hemorrhage was to that in which it occurred previously, as 10 to 2. The proportion for hæmoptysis was 12 to 7, and for the hemorrhages generally as 22 to 9. The disproportion between the intervals to the past and future storms would

have been found still greater, and the above ratios also nearer to each other, had we excluded from the estimate those storms which were three or more days distant, and which on that account may be presumed not to have exerted a sensible influence.

These facts tend to the conclusion, that atmospheric condition of *the period preceding a storm* is more conducive to hemorrhage than that which immediately succeeds one.

A confirmation of this conclusion is found by comparing the three days which immediately precede the hemorrhage with the three which immediately succeed it. For the proportion of the former, which were stormy, was, for both kinds of hemorrhage collectively, only $36\frac{1}{2}$ per cent., that of the latter $51\frac{1}{2}$. The disproportion was greater for the uterine and less for the pulmonary, but still the balance was on the same side.*

Moreover, the hemorrhages usually occurred at the conclusion of several days which had presented less than the usual amount of falling weather. The proportion of days of rain and snow for the corresponding years was 44 per cent., for the corresponding months 45 per cent.; and for the three-day periods preceding the hemorrhages $36\frac{1}{2}$ per cent.; for the three days preceding uterine hemorrhages 33, and for the three days succeeding them 59 per cent. Thus it was eminently the case with uterine hemorrhages, that they were *preceded* by an unusual amount of dry and *fair*, and *succeeded* by an unusual amount of *foul*, weather, the succeeding and preceding stormy days being to each other nearly as two to one.

We may conclude then, first, that the time of an attack of hæmoptysis or uterine hemorrhage is usually farther removed from the nearest preceding days of falling weather than from the nearest succeeding ones. It may be expressed by saying, that the attack is oftener *before* a storm than *after* a storm. Secondly. The stormy days which precede the hemorrhage are usually less numerous than those which succeed it, and indeed less numerous than for the same length of time in other parts of the corresponding month. Both these remarks are more strikingly exemplified in cases of uterine than in those of pulmonary hemorrhage.

On reviewing all the meteorological circumstances, we see the mean results, whether barometrical, thermometrical, or hygrometrical, all conspiring to point to a time of *transition* from a fair and *dry*, to a more foul and *stormy* period, or at least to a time characterised by great electrical changes, and especially to the development of much free electricity in the upper regions of the atmosphere, by the precipitation and even crystallisation of aqueous vapour. That an electrical, or what may even be termed, in many cases at least, a magnetic influence, and one which operates at a distance, is one of the most influential of the morbific agencies concerned in the above results, I am strongly inclined to believe.

* The separate results may be seen in columns second and third of table I. and II.

As the stages of disease and various internal and external circumstances must contribute to determine the precise time of an attack of hemorrhage, the scientific physician will not be surprised at the want of correspondence between the meteorological and medical results in many particular instances, but will be led by the former considerations to admit the reality and appreciate the importance of atmospheric agencies which, in spite of all other disturbing influences, still manifest themselves in the average results.

TABLE I.—*Uterine Hemorrhage.*

Number of Case.	Time of attack.	Number of days of rain or snow in three preceding days.	Number of days of rain or snow in three succeeding days.	Proportion in corresponding month.	Time to first preceding rain or snow.	Time to 1st succeeding rain or snow.	Barometer in preceding twenty-four hours.	Barometer at time.	Barometer compared with the mean.		Dew point for the day.	Dew-point for the month.	Diff. between dew point and temp.	Difference for month.
					deg.	deg.			above	below	deg.	deg.	deg.	deg.
	1834.													
1	May 29, A. M.	0	2	.51	0	0	F.	F.		20	50	42	6	16
2	June 8, 11 A. M.	1	1	.40	3	2	F.	F.		3	58	56	19	10
3	October 11,	1	1	.35	2	2	R.	F.	38					
4	Nov. 6, morning,	0	2	.37	9	2	R.	F.	23					
5	December 23,	2	3	.51	3	1	R.	R.	23					
	1835.													
6	April 2,	1	2	.53	0	0	F.	F.		28				
7	July 7,	2	2	.48	2	1	F.	F.		17	64½	62	9½	8
8	September 12, P. M.	1	2	.33	0	0	F.	F.	0	0	48	47½	9½	7
9	September 30,	1	2	.33	2	1	F.	F.		23	35	47½	9	7
10	October 5,	2	2	.29	0	0	R.	F.		5	46½	44½	2	5½
11	October 14,	0	0	.29	7	5	F.	F.	17		46	44½	4½	5½
12	November 9,	2	2	.60	2	2	F.	F.		6				
13	Novem. 11, 3 A. M.	0	3	.60	0	0	F.	F.		69				
14	Novem. 14, 9. P. M.	3	2	60	0	0	R.	R.	12					
15	Decem. 4, evening,	1	2	.48	0	0	F.	F.		8				
16	December 11,	2	2	.48	2	1	R.	F.	59					
	1836.													
17	January 15, 4 P. M.	0	2	.48	0	0	R.	R.	4					
18	February 6,	2	2	.48	2	1	R.	R.	23					
19	February 13, P. M.	1	0	.48	0	0	F.	F.		13				
20	April 5,	0	0	.43	3	4	R.	R.	14		13½	30	10½	9
21	September 9, 3 P. M.	0	3	.50	0	0	F.	R.		2	51	52½	7	8½
22	Sept. 9, early A. M.	0	3	.50	4	½	F.	S.	0	0	51	52½	7	8½
23	Septem. 22, 2 P. M.	0	3	.50	0	0	F.	F.	6		59	52½	5	8½
24	Sep 28, 29, midnight	1	1	.50	1	3¼	R.	R.		18	33	52½	10	8½
25	October 10, 9 P. M.	1	2	.55	3¾	1¼	R.	R.	37		27½	34	8	5
26	October 29,	1	0	.55	0	0	R.	R.		7	22½	34	15½	5
	1837.													
27	February 5,	2	2	.46	0	0	R.	F.	44					
	Averages, - -	.33	.59	.46½	1.69	1.01	F. 14 R. 13	F. 17 R. 9 S. 1	Sum. 300 Mean 11	Sum. 219 Mean 8	43.3°	46.6°	8 9°	8°

TABLE II.—*Hæmoptysis.*

Number of Case.	Time of attack.	Number of days of rain or snow in three preceding days.	Number of days of rain or snow in three succeeding days.	Proportion in corresponding month.	Time to first preceding rain or snow.	Time to 1st succeeding rain or snow.	Barometer in preceding twenty-four hours.	Barometer at time.	Barometer compared with the mean.		Dew-point at time.	Dew point for month.	Diff. between dew-point and temp.	Difference for month.
									above	below				
	1834.				deg.	deg.					deg.	deg.	deg.	deg.
1	May 20,	0	1	.51	0	0	F.	F.	15		50	42	6	16
2	June 13,	1	1	.40	0	0	F.	F.		11	50	56	8	10
3	June 18,	2	2	.40	0	0	F.	F.		34	57	56	3	10
4	June 19,	3	1	.40	0	0	F.	R.		37	59	56	3	10
5	June 23,	1	1	.40	2	1	F.	F.		12	61	56	15	10
6	June 28, early A. M.	0	2	.40	0	0	F.	R.	10		52¼	56	12	10
	1835.													
7	March 4,	0	1	.29	4	3	R.	R.	54					
8	May 1,	2	1	.35	2	3	F.	F.		12				
9	May 4,	0	2	.35	0	0	F.	F.		19				
10	June 25, 3 A. M.	1	2	.53	2¼	½	F.	F.		20	57	53	10	15
11	September 18,	0	3	.33	4	1	F.	F.	17		54	47	6	8
	1836.													
12	April 7,	0	1	.43	5	2	R.	F.	23		20	30	9	9
13	June 24, noon,	2	3	.57	0	0	R.	F.	10		51	57½	10½	7
14	June 27, 5 P. M.	3	2	.57	½	1	F.	F.		5	58	57½	6¼	7
15	July 18, P. M.	0	1	.35	4¼	2¾	R.	F.	23		54	60	12	11
16	July 18, 4 P. M.	0	1	.35	4¼	2¾	R.	F.	23		54	60	12	11
17	July 23, 2½ A. M.	2	1	.35	1	1½	R.	F.		15	54	60	8½	11
18	Sept. 29, 3 A. M.	1	1	.50	1	3½	R.	R.		16	31½	52½	11½	8½
19	Sept. 30, 10 P. M.	1	2	.50	2¾	1¼	R.	F.	18		37½	52½	8½	8½
20	October 7,	3	0	.55	0	0	R.	R.		8	37½	34	7½	5
21	October 9, 10 P. M.	2	1	.55	2¾	2¼	R.	R.	29		33	34	7	5
22	October 10, 6½ A. M.	1	2	.55	3¼	1¾	R.	R.	32		27½	34	8	5
23	November 2, 7 A. M.	0	0	.47	4¼	8¾	F.	F.	0	0				
24	Novem. 27, 9 A. M.	3	1	.47	¾	2¾	R.	R.	6					
	1837.													
25	February 9,	2	1	.46	1	3	R.	F.	24					
26	February 10, 9 P. M.	1	1	.46	2¼	1¾	F.	R.	13					
27	April 30, 7 A. M.	1	1	.40	0	0	F.	F.		4				
	Averages, - -	.40	.44½	.44	1.78	1.61	F. 14 R. 13	F 18 R. 9	Sum. 297 Mean 11	Sum. 193 Mean 7	47.3°	50.2°	8.6° Mean	9.3° Mean

ART. VII.—*Plastic Operations.* By J. PANCOAST, M. D., Professor of Anatomy in Jefferson Medical College. Lecturer on Clinical Surgery at the Philadelphia Hospital.

IN the last No. of this Journal I offered some general observations in reference to the different methods employed in Plastic Surgery for the reconstruction of lost parts, and related some cases illustrative of their application to the restoration of the Nose. I shall now detail the results of some operations exhibiting the further application of the principles involved in those processes, to the restoration of lost portions of the external Ear, of the Eyelids, and Lips.

Otoplasty.—The art of restoring portions of the external ear, is as old as that of the re-formation of the nose. No attempt has perhaps ever been made to re-construct an ear entire, and it is very questionable if the trial was made, that it could, from the peculiar formation of the organ, be attended